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Generic Requirements for Operations Based on the Telecommunications Management Network (TMN) Architecture

Generic Requirements for Operations Based on the TMN Architecture

Contents

1.   Introduction

The Telecommunications Management Network (TMN) provides an architectural
framework for the management and operation of telecommunications networks and
services. TMN introduces a layered architecture consisting of five logical layers: Network
Element Layer (NEL), the Element Management Layer (EML), the Network Management
Layer (NML), the Service Management Layer (SML), and the Business Management
Layer (BML), and five Management Functional Areas (MFAs): Performance Management,
Fault Management, Configuration Management, Accounting Management, and Security
Management (see ITU-T Recommendations M.3010, *Principles for a Telecommunications
Management Network* and M.3400, *TMN Management Functions*). See Section 2 for
further definition and discussion of the TMN logical layers and MFAs.

In TA-TSV-001294, *Generic Requirements for EML Functionality and Architecture,*
Bellcore began the process of developing and proposing generic requirements for the EML,
focusing on managing network resources individually or in aggregation as a group of
network elements. The TA identified a set of generic operations functions viable for use in
the EML and also showed how those generic functions fit together in a larger distributed
network architecture. This Generic Requirements (GR) document extends that work to all
the layers of the TMN architecture.

This document serves as a framework to define a comprehensive set of functions that a
TMN should provide and discusses the relationship of these functions within the
management layers. This framework is intended to assist a telecommunications network/
service provider in identifying its needs for introducing and supporting new services for its
customers and serves as a means of conveying those needs to its telecommunications
equipment and operations support system providers.

1.1   Purpose

This document, by describing proposed functions for the TMN architecture, will provide a
common frame of reference for discussion with potential application developers of TMN
applications. It is also intended to provide a functional description foundation for the
specification of interfaces between functions in the five TMN layers. Detailed descriptions
of the TMN interfaces are not part of this document and are subjects for future work.

1.2   Scope

This document identifies and provides descriptions of TMN functions and, through the use
of example scenarios, identifies and characterizes interactions between those functions.
The functions and interactions described in the body of this document are not intended to
be technology- or supplier-specific.

1.3 Audience

The intended audience of this document is:

- Systems engineers and software developers interested in providing TMN applications

  — This document provides them with a functional and architectural framework and a common set of terminology so that the functionality of a prospective TMN application (e.g., NE or management system) can be clearly and specifically described and the interface implications for such an application residing within a TMN can be understood or derived.

- Systems engineers and software developers of existing TMN applications which would need to interact with each other and new applications

  — Similar to above, this document will enable them to clearly and specifically describe the functionality of their application so that potential overlaps of functionality with other similarly described (new and embedded) applications can be identified and necessary interface functionality can be derived.

- Telecommunications equipment suppliers

  — This document provides them with a functional and architectural framework for the management applications needed to support their equipment in the context of the network and services offered by the network. For suppliers who either already provide or plan to provide management applications along with their equipment, this document provides the features discussed above.

- Computing platform suppliers interested in providing a computing environment for the development and support of TMN applications

  — This document provides them with a view of the management functions to be supported by TMN applications, the interface technologies dictated by TMN standards, and the application design and implementation flexibilities possible within the TMN context. In addition, a discussion is provided in this document of common operations management functions that could potentially be supplied by the computing platforms themselves in support of the TMN applications to be built on the platform.

- Telecommunications network/service providers' operations planners and implementers

  — This document provides such purchasers of network equipment and TMN applications with a functional and architectural framework and a common set of terminology so that the functionality needed for a new application or modifications needed for an embedded application can be clearly and specifically described to potential suppliers. The framework provided in this document also enables them to compare responses from various prospective suppliers as to functionality and to

2. Basic Principles

This GR document serves as a basis for ongoing Bellcore generic requirements for layers of the TMN architecture and for contributions to standards bodies for the further definition of TMN functions and interfaces. This section describes the basic motivations for defining a comprehensive set of TMN functionality addressing all layers. It also describes the principles of TMN and characteristics of the resulting operations environment where functions interact between layers and across function groups. It describes potential strategies for implementing the TMN layered architecture, emphasizing the distinction between physical and logical and illustrating that the TMN logical architecture does not dictate a physical implementation. This section also describes the high-level characteristics of products in order to be considered consistent with TMN principles. Detailed definitions of TMN conformance are provided in Section 12.

2.1 TMN and the Telecommunications Network

A Telecommunications Management Network (TMN), as defined in ITU-T Recommendation M.3010, supports the management requirements of administrations to plan, provision, install, maintain, operate and administer telecommunications networks and services. A TMN provides management functions for telecommunication networks and services and offers communications between itself and the telecommunications networks, services, and other TMNs.

A telecommunications network may consist of access, transmission, switching and signalling equipment to support telecommunications services. Intelligent NEs are becoming an ever-increasing part of the network. The TMN utilizes this intelligence in the network to provide management; however, the TMN is not limited to the management of intelligent NEs and may be used to manage any NE. The TMN may also be used to manage NEs on an individual or collective basis where a collection of NEs is defined as any set of NEs that can be managed as a whole having a set a common characteristics or capabilities. Some examples of characteristics or capabilities that may be considered in defining a collection of NEs are:

- Equipment type such as a collection of SONET Add/Drop Multiplexors (ADM)

- Supplier type for NEs from a single supplier or partnership of suppliers such as Host - Remote loop access equipment

- Geographical proximity such as a wire center or serving area

- Topology such as interconnected Asynchronous Transfer Mode (ATM) switches

- Features or capabilities to meet a particular service or customer need such as a collection of NEs to provide video services or a customer's private network

- Administrative domain such as all of the NEs served by a single maintenance service center.

This GR document defines functionality that is found in a TMN to manage a telecommunications network comprised of NEs or collections of NEs and the services provided by that telecommunications network. The TMN functionality as defined in this document offers capabilities to manage the delivery and support of new services such as wireless services, Advanced Intelligent Network (AIN) services, and video services as well as basic services.

2.2   Benefits of Implementing a TMN

Telecommunications service providers are facing increased competition for market share. To be competitive and provide quality service they need high-quality operations capabilities to support their service offerings and they need to design their operations architecture to be efficient, cost-effective and rapidly deployable. They must be able to communicate their individual needs to suppliers to facilitate the rapid and cost-effective delivery of quality operations systems/applications.

Implementation of the TMN architecture assists telecommunications service providers in improving time-to-market by providing increased structure and more rigorous principles for the design and development of their operations architecture. It will allow them to easily communicate their needs to suppliers and to evaluate suppliers products in response to those needs. Use of the TMN architecture facilitates the identification of areas for operations efficiencies through the analysis of the functionality needed to support services and technologies. The TMN architecture as defined in this GR document identifies logical groupings of functionality for implementation and is based on the concepts of modularity and interoperability through the use of open, standard interfaces. These concepts promote flexibility and system integration to provide cost-effective delivery of quality operations systems/applications.

Designing management products that follow the TMN constructs provides a common base of capabilities that can be used by large and small telecommunications providers both nationally and internationally. Network and operations suppliers can position their products using common terminology based on a comprehensive set of well defined TMN functions and interfaces to meet customer needs. Improved development cycles and economies should result through commonality and reusability of modular product offerings with open interfaces. Increased customer satisfaction as a result of providing cost-effective, high quality products that can be rapidly deployed will be the overarching benefit of implementing the TMN architecture.

4.6 Configuration Management Scenarios

This section provides a set of scenarios that may be used to validate the Configuration Management functional definitions, to provide natural groupings of functionality, and to identify possible interactions that occur as a result of the scenarios. The scenarios for Configuration Management are:

- Service activation

- Immediate service activation with pre-equipped resources

- Customer request to activate capacity

- Capacity provisioning for new and/or existing services

- Customer request for network information

- Logistics.

Each scenario describes the activities that may occur, identifies interactions with other Management Functional Areas as appropriate, and provides a high level view of the associated data. **The scenarios and the associated data are provided only for the purpose of illustrating how MAFs may be linked to form useful management processes . They are neither comprehensive nor exclusive.** Appendix A contains a cross reference of the interactions between Management Functional Areas and a data cross reference table showing all of the scenarios using each data item.

4.6.1 Service Activation

A possible service activation scenario is shown in Figure 4-1. This scenario incorporates many activities associated with service activation. As a result, it is more of a reference scenario than a view of an actual sequence of activities. Other scenarios included in this section align more closely with actual flows for Configuration Management.

This flow is triggered by a customer request for service. While the scenario explicitly illustrates a request to activate new service, the flow is similar for making changes to existing service and discontinuing service. The request may be made by a person or via a machine-to-machine interface. This flow may require modification for specific services such as AIN.

Pre-equipping and immediate activation will simplify this scenario considerably. See the scenario in Section 4.6.2 for a streamlined service activation flow assuming pre-equipped resources and immediate service activation.
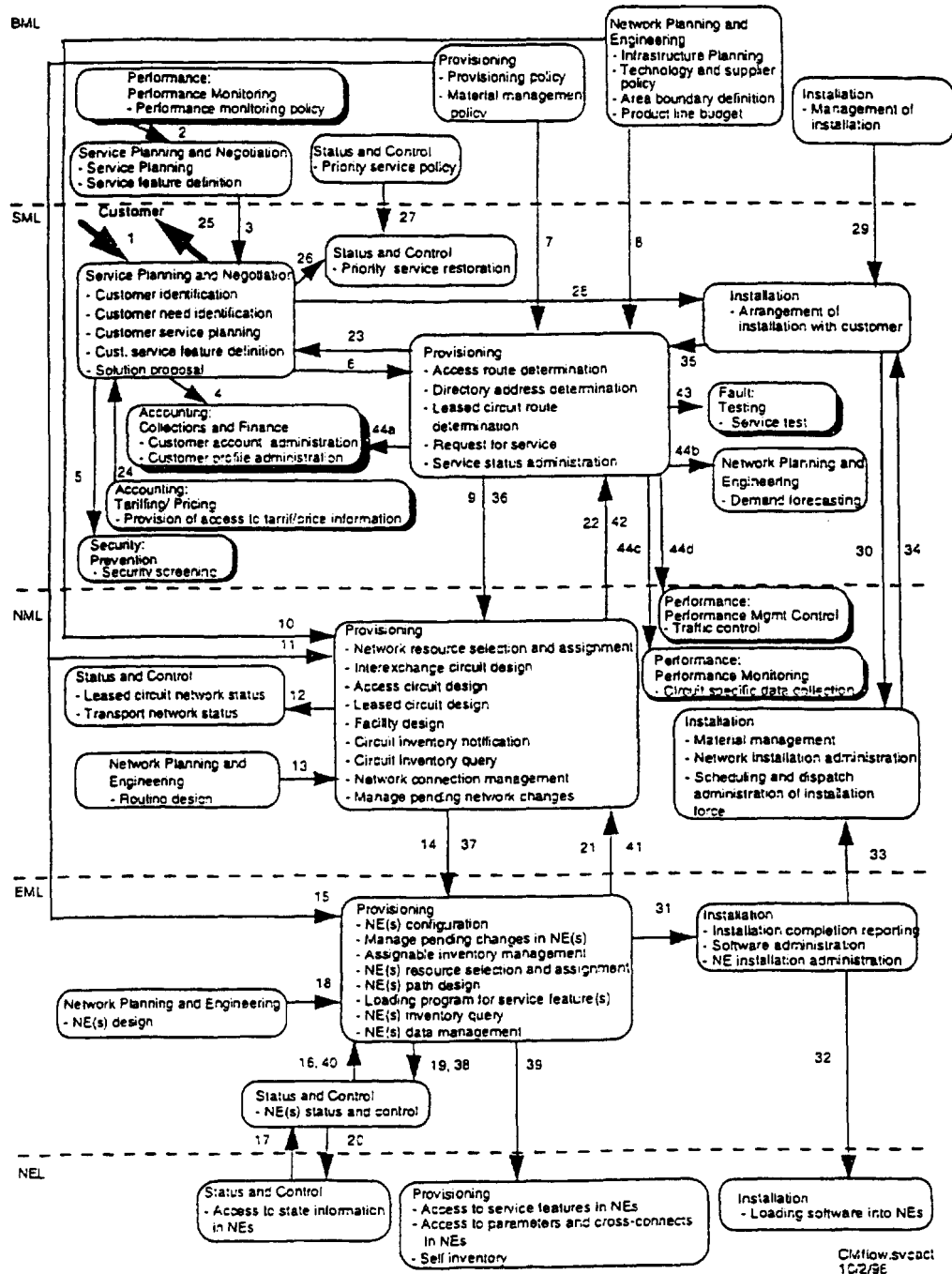
Figure 4-1. Service Activation

1. A request for service may be received via direct customer contact, entered through a Customer Network Management (CNM) system or via electronic bonding. For initial service, the most likely scenario is for direct customer contact with a service representative. Service changes, rearrangements, and disconnects may be done via a CNM system or electronic bonding. The customer and the customer need is identified. Customer service planning and Customer service feature definition may be invoked to tailor services to the identified customer needs.
   Associated Data:

Customer ID	Service Location
Bill Name	Bill Address
Credit Data	Usage History
Customer Service Need(s)	Current Service Data
Activation Time / Date	

2. BML Performance Management - Performance Monitoring - Performance monitoring policy provides information to Configuration Management Service Planning and Negotiation at the BML to establish performance criteria when designing standard service offerings.
   Associated Data:
   Performance Policy Guidelines

3. The SML Service Planning and Negotiation provides standard service offerings that can be used in negotiation service with a customer.
   Associated Data:
   Feature Description
   Tariff Data
   Standard Service Offering

4. Customer information is sent to the Accounting - Collections and Finance - Customer account administration and Customer profile administration to establish or change customer account records and to provide credit checking information, as required. If a tariffed service is requested, details about the service may also need to be forwarded to accounting to ensure the correct billing is established.
   Associated Data:

Customer ID	Service Location
Bill Name	Bill Address
Credit Data	Tariff Data
Proposed Service Description	Request ID
Proposed Activation Time & Date	Billing Information

5. Customer information may also be sent to Security - Prevention - Security screening to validate a customer's ability to pay for service.
   Associated Data:
   Bill Name
   Usage History
   Credit Data

6. Based on the customer location and the service required, the access route is determined and a directory address (e.g., telephone number) is assigned. At this time, a leased circuit route may be determined via Leased circuit route determination functionality in Provisioning.
   Associated Data:
   Customer ID   Service Location
   Request ID   Service Description
   Activation Time / Date

7. BML Provisioning policy may be used in the initial determination of the access or leased circuit (private line) route.
   Associated Data:
   Equipment Provisioning Guidelines
   Material Management Guidelines

8. Network Planning and Engineering policy such as technology, supplier, provisioning, and materials management, may be used in the initial determination of the access or leased circuit (private line) route.
   Associated Data:
   Technologies Selection Guidelines
   Supplier Selection Guidelines
   Service Areas Boundary Definition
   Planned Infrastructure Changes

9. Service parameters, including priority designations as appropriate, and customer locations are forwarded to NML provisioning to design the circuit and select the appropriate network resources.
   Associated Data:
   Request ID   Circuit ID
   Service Location   Service Description
   Activation Time / Date

10. BML - Network Planning and Engineering - Technology and Supplier policies and Product line budget may serve as input to the NML - Provisioning design activities.
    Associated Data:
    Technologies Selection Guidelines
    Supplier Selection Guidelines
    Allocated Resource Funding

11. BML - Provisioning - Provisioning and Material management policies may serve as input to NML - Provisioning design.
    Associated Data:
    Equipment Provisioning Guidelines
    Material Management Guidelines

12. The NML Status and Control is used to determine the status and availability of the network.

Associated Data:

Request ID	Circuit ID
Switching Components Status	Leased Circuit Status
Time & Date Stamp	

13. Network Planning and Engineering - routing designs may serve as input to the NML - Provisioning design. Using input from items 10 through 13, NML Provisioning creates a circuit design to meet customer and service specifications and take into account protection services, as appropriate.

    Associated Data:
    Request ID
    Circuit ID
    Proposed Route Design

14. Network information, including routing is forwarded to EML provisioning to request detailed NE assignments.

    Associated Data:

Request ID	Circuit ID
Routing Design	Facility Design
Leased Circuit Design	Selected Resources
Activation Time / Date	

Using input from items 15 through 18, EML Provisioning creates NE(s) path designs to meet customer and service specifications and take into account protection services, as appropriate

EML - Provisioning - is then invoked to select ports and facilities from all of the available resources to complete the design, selection, and assignment process. Activation of network resources may occur at the same time as the selection and assignment of network resources if all resources are available and immediate activation is required (see Immediate Service Activation - Section 4.6.2). EML NE(s) Status and Control may be requested to change a service status of an NE(s) resource to a reserved state pending future activation.

15. BML - Provisioning - Provisioning and Material management policies may serve as input to the EML - Provisioning design.

    Associated Data:
    Equipment Provisioning Guidelines
    Material Management Guidelines

16. EML Status and Control - NE(s) status and control is accessed to retrieve the status and availability of NE(s) resources.

    Associated Data:

Request ID	NE ID
NE(s) Resource Service State	Time & Date Stamp

17. NEL Status and Control - Access to state information in NEs is accessed to retrieve the status and availability of NE resources.

<u>Associated Data:</u>

Request ID

NE ID

NE States and Status Attributes

Time & Date Stamp

18. Network Planning and Engineering - NE(s) design may provide input to EML -
Provisioning - NE(s) path design.
<u>Associated Data:</u>

Request ID

NE ID

NE Configuration Design

NE Capabilities

Time & Date Stamp

19. NE(s) Resource selection and assignment may request NE(s) status and control to
change a service state of an NE resource to a reserved state pending future activation.
Success or failure of the change is reported as part of this interaction.

20. NE(s) status and control requests Access to state information in NEs to change a
service state of an NE resource to a reserved state pending future activation. Success
or failure of the change is reported as part of this interaction.
<u>Associated Data:</u>

Request ID

NE ID

State Change Request Data

Activation Time / Date

Time & Date Stamp

21. Resource availability for a collection of one or more NEs is returned to NML -
Provisioning. If resources are not available, this information should also be provided
so that the appropriate steps can be taken to make resources available or to find an
alternate route where resources are available. Success or failure of the change is
reported as part of this interaction.
<u>Associated Data:</u>

Request ID

Circuit ID

Service States

Time & Date Stamp

22. Circuit resource availability is returned to the SML so that service can be established
for the customer.
<u>Associated Data:</u>

Request ID

Circuit ID

Service States

Time & Date Stamp

23. The SML - Provisioning - Request for service and Service status administration update
the service request and Service status and forward the service availability information
to SML - Service planning and negotiation - Solution proposal.
<u>Associated Data:</u>

Request ID

Customer ID

Service Location

Service Availability Data

Time & Date Stamp

24. The SML - Accounting - Tariffing/Pricing - Feature pricing will provide information to SML - Service planning and Negotiation - Solution proposal on specific rates, tariffs and pricing for contracts.
    Associated Data:
    Service Rates
    Tariff Data
    Pricing Contracts

25. Once the service is designed and resources allocated, the proposed service solution is presented to the customer. The proposed solution should consist of service availability information, date of availability, and customer-affecting resources. Details about the resources to provide services are not anticipated to be part of the service proposal.
    Associated Data:
    Service Proposal
    Activation Time / Date

26. Priority services are designated to ensure immediate restoration in the event of a failure. Service protection through reconfiguration and priority restoration may be a billable item.
    Associated Data:
    Customer ID
    Service Location
    Priority Service Restoration Features

27. BML Status & Control - Priority service policy may provide input to the determination of priority services.
    Associated Data:
    Priority Service Guidelines

28. If installation requires access to customer equipment or customer participation a schedule for service activation is negotiated with the customer.
    Associated Data:

Request ID	Customer ID
Circuit ID	Service Location
Access Information	Activation Time / Date
Service Description	Facility Design

29. BML - Management of installation process may provide input to scheduling service for activation.
    Associated Data:

Scheduling Data	Material Delivery Date

30. If installation of resources is required that involves the customer (e.g., customer premises equipment), this information is forwarded to the appropriate work center via NML - Installation - Schedule and dispatch installation force. Notification about equipment installation and availability is provided to SML Provisioning Request for service and Service status administration. For network equipment installation that

does not involve the customer, interactions may occur between Provisioning and Installation at the NML.

Associated Data:

Request ID	Customer ID
Circuit ID	Service Location
Access Information	Activation Time / Date
Service DescriptionMaterial Delivery Date	
Test TypeFacility Design	

31. If the service requires a NE generic program load, this information is forwarded to EML - Installation - Software administration.

Associated Data:

Request ID	NE Software Load Information
Test Type	Activation Time / Date

32. Specific NE program load information is forwarded to NEL - Installation - Loading software into NEs. Acknowledgment of successful installation of software is returned. If the installation is not successful, it is backed out and the reason for failure is returned.

Associated Data:

Request ID	NE Software Load Information
Test Type	Activation Time / Date

33. Acknowledgment of successful hardware (i.e., plugs) and software (NE generic programs) are forwarded to NML - Installation - Schedule & dispatch administration of installation force. If installation is not successful, the reason for failure and any corrective action taken is forwarded.

Associated Data:

Request ID
Test Results
Time & Date Stamp

34. End-to-end resource installation status is forwarded to SML - Installation - Arrangement of installation with customer, if installation is not transparent to the customer.

Associated Data:

Request ID	Customer ID
Circuit ID	Service Location
Test Results	Time & Date Stamp

35. Notification about equipment installation and availability is provided to SML - Provisioning - Request for Service and Service status administration.

Associated Data:

Request ID	Customer ID
Circuit ID	Service Location
Test Results	Time & Date Stamp

36. The request for service is completed and a request to establish connections is sent to NML Provisioning - Network connection management. Network connection management will require EML - NE(s) configuration to establish a connection and set the appropriate features and parameters in the NEs. If immediate connection is required, steps 36 through 42 may be done in conjunction with steps 9 through 21.

    NML - Manage pending network changes is invoked to insure that connections occur in the proper sequence and do not override other connection activities in progress. For example, if a customer was attempting to make a connection at the same time as network reconfiguration was occurring to restore service after a failure, the customer connection would be blocked until network reconfiguration was complete.
    Associated Data:

Request ID	Circuit ID
Service Location	Service Description
Activation Time / Date	Reserved Route Design

37. NML Provisioning - Network connection management and Manage pending network changes forwards connection information to EML - Provisioning - NE(s) configuration and Manage pending changes in NEs.
    Associated Data:

Request ID	Circuit ID
Software Program	Associated Service Features
Parameter Settings	Leased Circuit Design
Reserved Resources	Activation Time / Date

    A request to establish connections is sent to EML Provisioning - NE(s) configuration and Manage pending changes in NEs. Manage pending changes in NEs is invoked to insure that connections occur in the proper sequence and do not override other connection activities in progress.

38. Information is sent to the EML- Status & Control - NE(s) Status and Control to change the state to in-service or other state as appropriate.
    Associated Data:

Request ID	NE ID
State Change Request Data	Reserved Resources
Activation Time / Date	Time & Date Stamp

39. The appropriate service features, parameters, and cross-connects will be activated at this time as appropriate.
    Associated Data:

Request ID	NE ID
NE Path	NE Configuration Design
Parameters Settings	Associated Service Features
Activation Time / Date	Time & Date Stamp

40. Notification of completion is returned to the EML - Provisioning - Manage pending changes in NEs. If connections cannot be completed the reason failure or corrective

action information should be provided.

Associated Data:

Request ID	NE ID
NE Resource Service State (40a)	Time & Date Stamp
NE Service Feature and Parameter status (40b)	

41. Notification of all NE activation completions or reason for failure should be returned to the NML - Provisioning - Manage pending network changes.

    Associated Data:

Request ID	Circuit ID
Service States	Time & Date Stamp

42. Notification of end-to-end connectivity or reason for failure or corrective action should be provided so that reassignment can be initiated.

    Associated Data:

Request ID	Circuit ID
Confirmation Report	Service States
Time & Date Stamp	

43. If pre-service testing is required, notification is sent to SML Fault Management - Testing - Test service.

    Associated Data:

Circuit ID	Service Location
Test Type	Commitment Time
Time & Date Stamp	Pre-Service Testing Indicator

44. Notification of service activation is provided to:

    a. Accounting - Collections & Finance - Customer account administration to begin the billing process.

    Associated Data:

Customer ID	Service Location
Request ID	Service Parameters
Service States	Service Charges
Activation Time / Date	Confirmation Report

    b. Configuration - Planning and Engineering about new service demand so that planning and engineering may begin monitoring usage and traffic volumes to determine when new resources are required.

    Associated Data:

    Circuit ID
    Confirmation Report
    Activation Time / Date

    c. Performance - Performance Monitoring - Circuit specific data collection to begin monitoring and data collection, as appropriate. Customers may have the ability to request information about the performance characteristics of their service both from

an end-to-end service view and from an access link view.

Associated Data:

Request ID	Circuit ID
Customer ID	Service Location
Confirmation Report	Service Description
Activation Time / Date	

d. Performance - Performance Management Control -Traffic control to begin traffic control and to permit the customer access to traffic information if appropriate.

Associated Data:

Request ID	Circuit ID
Customer ID	Service Location
Confirmation Report	Service Description
Activation Time / Date	

Detailed information about the circuit and the service riding on that circuit may need to be sent from Configuration Management - Provisioning to Fault Management for testing and to Performance Management for monitoring and traffic control. ·

4.6.2   Immediate Service Activation with Pre-Equipped Resources

A second, greatly simplified, service activation scenario is shown in Figure 4-2. This flow assumes that all equipment is in place and that activation will occur at the time of assignment (i.e., immediately). As with the previous flow, this flow is triggered by a customer request for service. While the scenario explicitly illustrates a request to activate new service, the flow is similar for making changes to existing service and discontinuing service. The request may be made by a person or via a machine-to-machine interface. This flow may require modification for specific services such as AIN.

Activities providing information that may be obtained in advance of the actual activation request, such as BML policy information are not shown but are assumed to be already in place. Only "real time" activities are shown. This scenario is a subset of the scenario in Section 4.6.1.
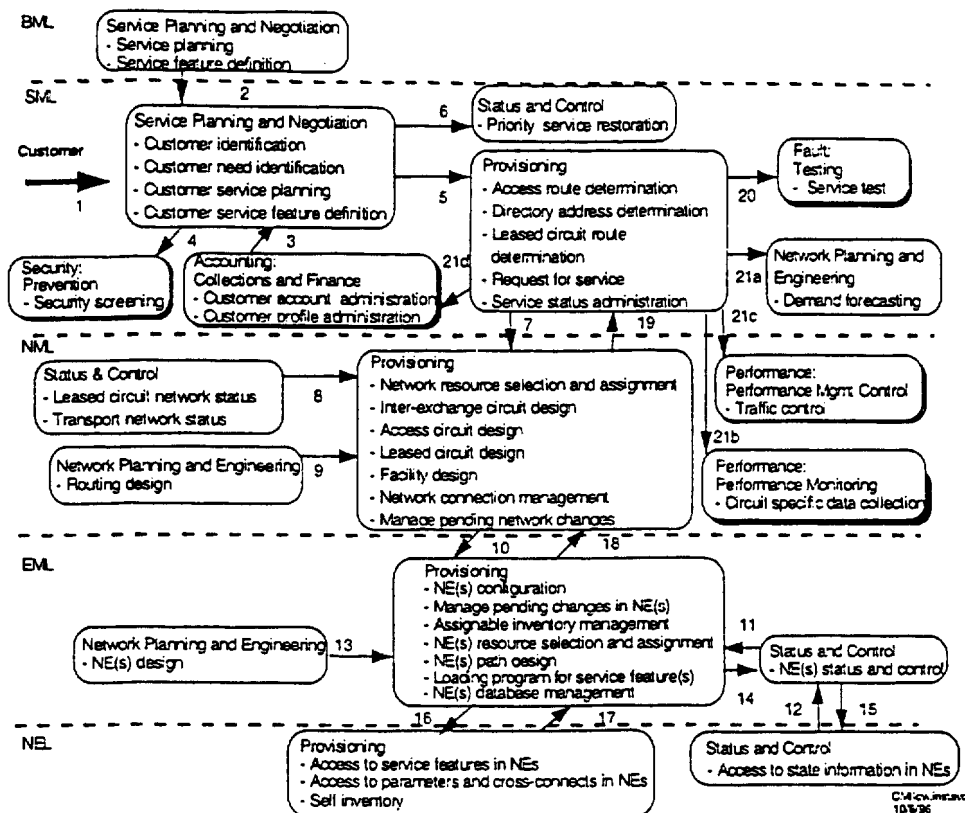
Figure 4-2. Immediate Service Activation with Pre-Equipped Resources

1. A request for service may be received via direct customer contact, entered through a Customer Network Management (CNM) system or via electronic bonding. For initial service, the most likely scenario is for direct customer contact with a service representative. Service changes, rearrangements, and disconnects may be done via a CNM system or electronic bonding. The customer and the customer need is identified. Customer service planning and Customer service feature definition functions may be invoked to tailor services to the identified customer needs.

<u>Associated Data:</u>

Customer ID	Service Location
Bill Name	Bill Address
Credit Data	Usage History
Customer Service Need(s)	Current Service Data

2. The SML Service Planning and Negotiation provides standard service offerings that can be used in negotiation service with a customer.

Associated Data:
Feature Description
Tariff Data
Standard Service Offering

3. Customer information from Service Planning and Negotiation is sent to the Accounting - Collections and Finance - Customer account administration and Customer profile administration to establish or change customer account records and to provide credit checking information, as required. If a tariffed service is requested, details about the service may also need to be forwarded to accounting to ensure the correct billing is established.
   Associated Data:

Customer ID	Service Location
Bill Name	Bill Address
Credit Data	Tariff Data
Proposed Service Description	Request ID
Proposed Activation Time & Date	Billing Information

4. Customer information from Service Planning and Negotiation may also be sent to Security - Prevention - Security screening to validate a customer's ability to pay for service.
   Associated Data:
   Bill Name
   Usage History
   Credit Data

5. Based on the customer location and the service required, the access route is determined and a directory address (e.g., telephone number) is assigned. At this time, a leased circuit route may be determined via Leased circuit route determination functionality in Provisioning.
   Associated Data:

Customer ID	Service Location
Request ID	Service Description
Activation Time/Date	

6. Priority services are designated to ensure immediate restoration in the event of a failure. Service protection through reconfiguration and priority restoration may be a billable item.
   Associated Data:
   Customer ID
   Service Location
   Priority Service Restoration Features

7. Service parameters, including priority designations as appropriate, and customer locations are forwarded to NML provisioning to design the circuit and select the appropriate network resources.

<u>Associated Data:</u>

Request ID	Circuit ID
Service Location	Service Description
Activation Time/Date	

Using input from items 7 through 9, NML Provisioning creates a circuit design to meet customer and service specifications, taking into account protection services, as appropriate.

8. NML Status and Control determines the status and availability of the network.
   <u>Associated Data:</u>

Request ID	Circuit ID
Switching Components Status	Leased Circuit Status
Time & Date Stamp	

9. Network Planning and Engineering - Routing designs may serve as input to the NML - Provisioning design functions.
   <u>Associated Data:</u>

Request ID	Circuit ID
Proposed Route Design	

10. Network information, including routing, is forwarded to the EML provisioning functionality to provide a basis for detailed NE assignments.
    <u>Associated Data:</u>

Request ID	Circuit ID
Routing Design	Facility Design
Software Program	Leased Circuit Design
Associated Service Features	Parameter Settings
Selected Resources	Activation Time/Date

11. The EML Status and Control functions are used to determine the status and availability of NE(s) resources.
    <u>Associated Data:</u>
    Request ID
    NE ID or Subnetwork ID
    Resource ID
    Resource Service State
    Time & Date Stamp

12. Access to state information in NEs is accessed to determine the status and availability of NE resources.
    <u>Associated Data:</u>
    Request ID
    NE ID
    Resource ID
    Resource Service State
    Time & Date Stamp

13. Network Planning and Engineering - NE(s) design may be accessed for input to the EML - Provisioning design functions. Using input from items 10, 11, and 13, the EML Provisioning functionality creates NE(s) designs to meet customer and service specifications, taking into account protection services, as appropriate.

    EML - Provisioning functionality is invoked to select ports and facilities from all of the available resources to complete the design, selection, and assignment process. Activation of network resources may occur at the same time as the selection and assignment of network resources if all resources are available and immediate activation is required.
    Associated Data:

Request ID	NE ID
NE Configuration Design	NE Capabilities
Time & Date Stamp	

14. EML Status and Control - NE(s) Status and Control may be invoked to change a service state of an NE(s) resource to an active state.
    Associated Data:

Request ID	NE ID or Subnetwork ID
State Change Request Data	Activation Time/Date
Time & Date Stamp	Resource ID

15. NEL Status and Control - Access to State Information in NEs may be invoked to change a service state of an NE resource to an active state.
    Associated Data:

Request ID	NE ID or Subnetwork ID
State Change Request Data	Activation Time/Date
Time & Date Stamp	Resource ID

16. NEL - Provisioning is invoked to store parameters, activate cross-connections and set service features.
    Associated Data:

Request ID	NE ID
NE Path	NE Configuration Design
Parameter Settings	Activation Time/Date
Time & Date Stamp	

17. Notifications of the completion of individual NE connections are returned to the EML Provisioning - Manage pending changes in NEs.
    Associated Data:

Request ID	NE ID
NE Resource Service status	Time & Date Stamp
NE Service Feature and Parameter status	

18. Notification of all NE activation completions are returned to the NML Provisioning - Manage pending network changes.
    Associated Data:

Request ID	Circuit ID
Service States	Time & Date Stamp

19. Confirmation of end-to-end connectivity is forwarded to the SML Provisioning - Service request function. SML Provisioning - Request for service updates the service request.
   Associated Data:

Request ID	Circuit ID
Confirmation Report	Time & Date Stamp
Service States	

20. If pre-service testing is required, notification is sent to SML Fault Management - Testing - Test service.
   Associated Data:

Circuit ID	Service Location
Test Type	Commitment Time
Time & Date Stamp	Pre-Service Testing Indicator

21. Notification of service activation is provided to:

a. Configuration - Planning and Engineering about new service demand so that planning and engineering may begin monitoring usage and traffic volumes to determine when new resources are required.
   Associated Data:

Circuit ID	Service Location
Service States	Activation Time/Date

b. Performance - Performance Monitoring to begin monitoring and data collection, as appropriate. Customers may have the ability to request information about the performance characteristics of their service both from an end-to-end service view and from an access link view.
   Associated Data:

Request ID	Circuit ID
Customer ID	Service Location
Confirmation Report	Service Description
Activation Time/Date	

c. Performance - Performance Management Control - Traffic control to begin traffic control and to permit the customer access to traffic information if appropriate.
   Associated Data:

Request ID	Circuit ID
Customer ID	Service Location
Confirmation Report	Service Description
Activation Time/Date	

d. Accounting - Collections & Finance - Customer profile administration to Customer account administration to begin the billing process.

Associated Data:

Customer ID	Service Location
Request ID	Service Parameters
Service States	Service Charges
Activation Time / Date	Confirmation Report

Detailed information about the circuit and the service riding on that circuit may need to be sent from Configuration Management - Provisioning to Fault Management for testing and to Performance Management for monitoring and traffic control.

4.6.3 Customer Request to Activate Capacity

Figure 4-3 is an example of how a customer may make changes to the services under their control and how those changes may affect the network. This flow starts with a customer with network management capabilities initiating a request to activate existing capacity that has been designated for their use.
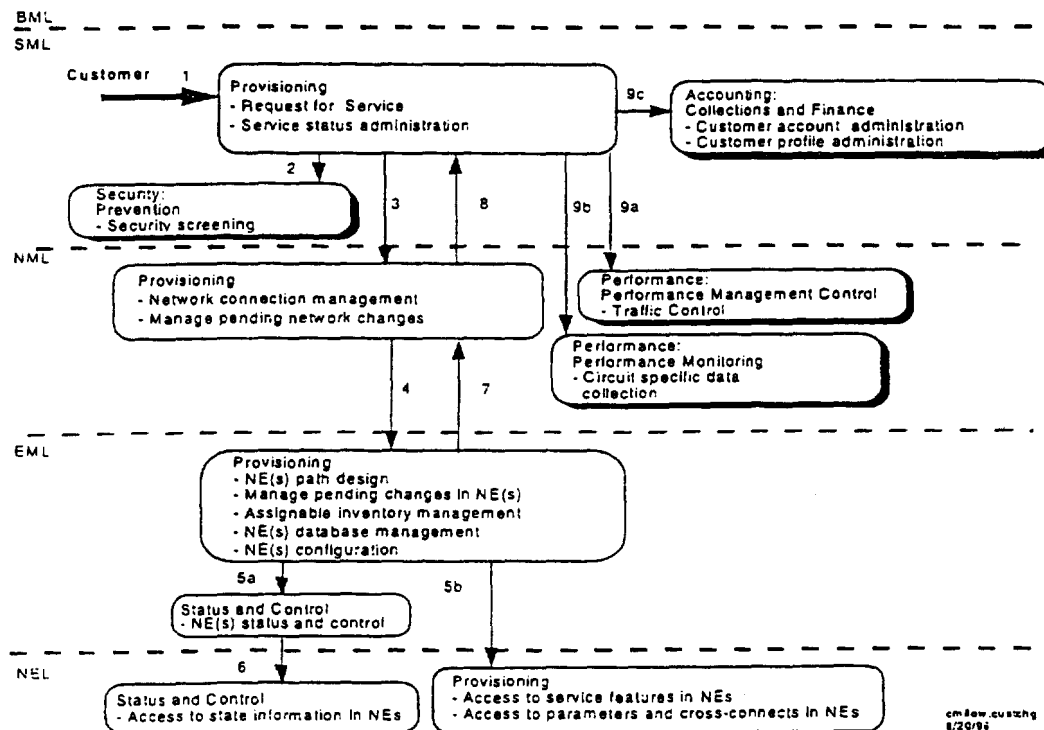

Figure 4-3. Customer Request to Activate Capacity

1. A customer with network management capabilities initiates a request to activate resources (e.g., bandwidth) that have been allocated for the customer's use. The